CLAIMS:

What is claimed is:

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1. A mechanism to be applied to an exterior surface of a cylindrical structure for reduction of the effect of Vortex Induce Vibration (VIV) in said cylindrical structure when immersed in flowing fluid, the mechanism comprising:

a generally cylindrical column having a central axis, an interior surface corresponding in size and shape to said exterior surface of said cylindrical structure to which said mechanism is to be applied, an outer surface and a wall thickness; and

a reduced wall thickness formed into said outer surface in a pattern to produce a discontinuity that interrupts the lengthwise coherence of vortex shedding from said outer surface when said cylindrical column is attached to the exterior of said cylindrical structure in said flowing fluid, thereby reducing the effect of VIV on said cylindrical structure.

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2. The mechanism for reduction of VIV as recited in claim 1 wherein the cylindrical structure further comprises a hull of an offshore vessel.

3. The mechanism for reduction of VIV as recited in claim 1 wherein the cylindrical structure further comprises a drilling riser.

4. The mechanism for reduction of VIV as recited in claim 1 wherein the cylindrical structure further comprises a production riser.

5. The mechanism for reduction of VIV as recited in claim 1 wherein the cylindrical structure further comprises a hybrid riser.

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6. The mechanism for reduction of VIV as recited in claim 1 wherein the generally cylindrical column further comprises a composite material on said outer surface..

7. The mechanism for reduction of VIV as recited in claim 1 wherein said reduced wall thickness formed in said pattern further comprises a plurality of notches.

8. The mechanism for reduction of VIV as recited in claim 7 wherein said plurality of notches further comprise notches having a right angled triangular cross-sectional shape.

9. The mechanism for reduction of VIV as recited in claim 7 wherein said plurality of notches further comprise notches having a rectangular cross-sectional shape.

10. The mechanism for reduction of VIV as recited in claim 7 wherein said pattern comprises said plurality of notches formed at a plurality of different circumferential positions along a length of said cylindrical column.

11. The mechanism for reduction of VIV as recited in claim 10 wherein an angular change in said different circumferential positions for a predetermined interval of length is between about 10 and 90 degrees for a preselected interval of length equal to between about .5 times the diameter and 10 times the diameter.

12. The mechanism for reduction of VIV as recited in claim 11 wherein said angular change in circumferential positions for each preselected interval of length is approximately 30 degrees.

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13. The mechanism for reduction of VIV as recited in claim 7 wherein the plurality of notches are elongated in the axial direction of the cylindrical column.

14. The mechanism for reduction of VIV as recited in claim 13 wherein the plurality of notches elongated in the axial direction of the cylindrical column are substantially parallel to the axis of said cylindrical column.

15. The mechanism for reduction of VIV as recited in claim 13 wherein the plurality of notches elongated in the axial direction of the cylindrical column are at an angle relative to the axis of said cylindrical column.

16. The mechanism for reduction of VIV as recited in claim 1 wherein said pattern of reduced wall thickness further comprises a helical pattern.

17. The mechanism for reduction of VIV as recited in claim 1 wherein said generally cylindrical column further comprises a plurality of axially aligned generally cylindrical shaped columnar sections and wherein said reduced wall thickness formed in a pattern along the length of said generally cylindrical column comprises at least one notch formed into an outer surface on each of said plurality of axially aligned columnar sections and said at least one notch on each columnar section at a different circumferential position relative to each adjacent columnar section.

18. The mechanism for reduction of VIV as recited in claim 17 wherein said generally cylindrical shaped columnar sections further comprise a plurality of sets of segments of a cylinder and a plurality cylindrical shape band clamps for holding said segments onto said exterior surface of said cylindrical structure to form said cylindrical columnar sections at least one of each set of said segments having a notch formed into an outer surface thereof and each set at different circumferential positions relative to

each other along a length of said cylindrical structure to place said notches in said pattern for interrupting said lengthwise coherence of vortex shedding.

19. The mechanism for reduction of VIV as recited in claim 18 wherein said segments of each cylinder forming set comprise junction ends having the same wall thickness as the junction ends of each adjoining segment to form a smooth cylindrical surface at said junction and said notch is formed in said at least one segment spaced form either junction end.

20. The mechanism for reduction of VIV as recited in claim 19 wherein said segments of each cylinder forming set comprise junction ends having the different wall thickness at the junction ends of each adjoining segment to form a reduced wall thickness and discontinuity at said junction.

21. A method for reducing vortex induced vibration in a generally vertically submerged cylinder comprising the steps of:

cutting a pattern of reduced wall thickness areas in the outer surface of a cylinder to be submerged; and

submerging said cylinder with said pattern cut into said outer surface such that the lengthwise coherence of vortex shedding is interrupted and the lift forces on the cylinder from said vortex shedding at one position along the length of the cylindrical structure are out of phase and cancel lift forces at another position, thereby reducing the effect of vortex induced vibration on the cylinder.

22. The method as recited in claim 21 wherein the step of cutting a pattern in the outer surface of the cylinder further comprises cutting a pattern in the outer surface of a hull of an offshore vessel.

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23. The method as recited in claim 21 wherein the step of cutting a pattern in the outer surface of the cylinder further comprises cutting a pattern in the outer surface of a drilling riser.

24. The method as recited in claim 21 wherein the step of cutting a pattern in the outer surface of the cylinder further comprises cutting a pattern in the outer surface of a production riser.

25. The method as recited in claim 21 wherein the step of cutting a pattern in the outer surface of the cylinder further comprises cutting a pattern in the outer surface of a hybrid riser.

26. The method as recited in claim 21 wherein the step of cutting a pattern in the outer surface of the cylinder further comprises cutting a pattern in the outer surface of a composite material on the outer surface of a riser.

27. The method as recited in claim 21 wherein the step of cutting a pattern in the outer surface of the cylinder further comprises cutting a plurality of notches in the cylinder.

28. The method as recited in claim 27 wherein the step of cutting a plurality of notches further comprises cutting a plurality of notches having a right angled triangular cross-sectional shape.

29. The method as recited in claim 27 wherein the step of cutting a plurality of notches further comprises cutting a plurality of notches having a rectangular shaped cross-section.

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~~30. The method as recited in claim 27 wherein the step of cutting a plurality of notches in the cylinder further comprises periodically changing the angular location of the notches on the cylinder at a constant interval of length along the cylinder.~~

~~31. The method as recited in claim 30 wherein the step of periodically changing the angular location of the notches on the cylinder at a constant interval further comprises periodically changing the angular location of the notches on the cylinder between 10 and 90 degrees for each interval of length equal to between .5 times the diameter and 10 times the diameter.~~

~~32. The method as recited in claim 30 wherein the step of periodically changing the angular location of the notches on the cylinder at a constant interval further comprises periodically changing the angular location of the notches on the cylinder approximately 30 degrees for each interval of length equal to about 1.5 times the diameter.~~

~~36~~ 33. The method as recited in claim 27 wherein the step of cutting a plurality of notches further comprises cutting a plurality that are parallel to the axis of the cylinder.

~~37~~ 34. The method as recited in claim 15 wherein the step of cutting a pattern in the outer surface of the cylinder further comprises cutting a helical pattern.

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35 ~~38~~. A submergible cylindrical assembly for positioning in a flowing body of water and to reduce the effect of vortex induced vibration (VIV), the cylindrical assembly comprising:

a cylindrical column having an axis, an outer surface, a wall thickness and a length; and

a pattern cut into the outer surface of said cylindrical column reducing the wall thickness at preselected locations, the pattern comprising a plurality of notches positioned such that the angular location of the notches on the outer surface of the cylindrical column changes along the length of the cylindrical column, thereby interrupting the lengthwise coherence of vortex shedding which reduces the effect of VIV on the cylindrical assembly.

36 ~~39~~. The cylindrical assembly as recited in claim 35 ~~38~~ wherein the cylindrical column further comprises a spar of an offshore vessel.

37 ~~40~~. The cylindrical assembly as recited in claim 35 ~~38~~ wherein the cylinder further comprises a drilling riser.

38 ~~41~~. The cylindrical assembly as recited in claim 35 ~~38~~ wherein the cylinder further comprises a production riser.

39 ~~42~~. The cylindrical assembly as recited in claim 35 ~~38~~ wherein the cylinder further comprises a hybrid riser.

40 ~~43~~. The cylindrical assembly as recited in claim 35 ~~38~~ wherein the cylinder further comprises a composite material on the outer surface.

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~~44~~ 41. The cylindrical assembly as recited in claim ~~39~~ 34 wherein the notches further comprise right angled triangular notches.

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~~45~~ 42. The cylindrical assembly as recited in claim ~~38~~ 35 wherein the interval is approximately 30 degrees.

~~46~~ 43. The cylindrical assembly as recited in claim ~~38~~ 35 wherein the direction of the notches is parallel to the axis of the cylinder.

~~47~~ 44. The cylindrical assembly as recited in claim ~~38~~ 35 wherein the pattern further comprises a helical pattern.

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